CHAPTER 6

WATER POLLUTION CONTROL PROGRAMS

POINT SOURCE CONTROL PROGRAM

Wastewater Treatment Facility Permitting

Point source pollution refers to any discharge from municipal or industrial facilities that can be identified as emanating from a discrete source such as a conduit or ditch. Kentucky has a total of 5,946 facilities covered by the Kentucky Pollutant Discharge Elimination System (KPDES) program. The program has 2,676 facilities covered under individual permits and 3,179 facilities covered under two general permits. The individually permitted facilities include 56 major municipals and 220 major industrials. In addition, new federal mandates require expansion of the point source program to include stormwater runoff.

Wastewater permit limits in Kentucky have been water quality-based since National Pollutant Discharge Elimination System (NPDES) program delegation on September 30, 1983. Generally, there are two approaches for establishing water quality-based limits for toxic pollutants: (1) chemical-specific limits, meaning the use of individual chemical criteria (which are derived for the protection of aquatic life) for determining discharge limits for all known toxic or suspected toxic pollutants in an effluent; or (2) whole effluent toxicity testing, which sets limits on an effluent's total toxicity, as measured by acute and/or chronic bioassays on appropriate aquatic organisms. Both approaches have advantages and drawbacks, but when both are integrated into a toxics control strategy, they provide a flexible and effective control for the discharge of toxic pollutants.

Toxicity data are available for only a limited number of compounds. Single parameter protection criteria, therefore, often do not provide adequate protection of aquatic life where the toxicity of the components in the effluent is unknown, where there are synergistic (greater than predicted) or antagonistic (less than predicted) effects between toxic substances in complex effluents; and/or where a complete chemical characterization of the effluent has not been carried out. Since it is not economically feasible to determine the toxicity of each of the thousands of potentially toxic substances in complex effluents or to conduct exhaustive chemical analyses of effluents, the most direct and cost-effective approach to measuring the toxicity of effluents is to conduct effluent toxicity tests with aquatic organisms. By the end of 1987, Kentucky had incorporated biomonitoring requirements into the permits of six major municipalities and seven major industries. It is anticipated that appropriate biomonitoring requirements will be included in most major permits and in many selected minor facility permits.

Kentucky's water quality continues to face a threat from improperly treated industrial waste which is discharged into municipal sanitary sewage systems. Such waste often contains pollutants that are not removed by the municipal treatment process or, if removed, result in the generation of contaminated sludge. Kentucky has approved 57 pretreatment programs and has screened other facilities to assess the need for pretreatment programs. The facilities needing programs are on schedule for obtaining approval. Each approved program submits semi-annual status reports to the Division of Water for review and incorporation into the Permit Compliance System (PCS) and Pretreatment Permits and Enforcement Tracking System (PPETS).

Municipal Facilities

The Construction Grants Program has resulted in the construction of $85.8 million in wastewater projects which came on line during 1986-1987 as indicated in Table 32. Twenty-one municipal wastewater projects were completed during this two year period. An additional 16 projects are in various stages of construction.

Significant improvements in water quality have been realized through the construction of new wastewater treatment facilities. A review was made of facilities completed during 1986-1987 which had discharges to surface waters. The discharge monitoring reports indicated significant reductions in pollutants.

Table 32

Construction Grants Funded Projects Which Came On Line During Calendar Years 1986 and 1987

Project	Date on Line	Design Flow (MGD)	Treatment* Cost	Other Cost
Augusta	Feb. 86	0.170	$ 416,333	$ 214,475
Berea	Oct. 87	2.100	$6,178,465	$2,668,514
Boyd/Greenup	Oct. 87	Sewers	$ -0-	$ 486,432
Carrollton	Feb. 86	0.700	$3,406,874	$ -0-
Centertown	Mar. 87	0.045	$ 578,000	$1,178,000
Fleming-Neon	Mar. 87	0.485	$1,699,000	$5,330,000
Flemingsburg	Dec. 86	0.656	$2,950,122	$ 247,081
Florence	Oct. 86	Sewers	$ -0-	$8,862,885
Fountain Run	Nov. 86	0.028	$1,793,000	**
Franklin	Jan. 86	3.200	$3,992,000	$1,669,000
Lexington M/S	Apr. 86	Sewers	$ -0-	$2,860,000
Lexington S/E	Mar. 87	Sewers	$ -0-	$5,075,552
Livermore	Nov. 86	Sewers	$ -0-	$ 165,000
London	Jan. 86	4.000	$6,155,000	$1,281,000
Middlesboro	Jan. 87	2.800	$9,492,000	$2,903,000
Midway	Feb. 86	0.253	$1,648,053	$ 275,690
Milton	Dec. 87	0.160	$ 535,476	$1,439,942
Monticello	Mar. 87	0.700	$3,186,000	$1,541,000
Sadieville	Feb. 86	0.033	$ 935,149	$ 599,634
Stanford	Jan. 87	0.800	$2,297,000	$ 263,000
Sturgis	Dec. 87	0.500	$2,554,000	$ 186,000
Totals			$47,816,472	$37,046,205

*Cost includes local share
**Subsurface wastewater disposal system

Although significant improvements in water quality have been realized through the construction of new wastewater treatment facilities, there are numerous needs that remain to be addressed. The 1986 Needs Survey, conducted by the Division of Water as part of its planning process, indicated that municipal dischargers continue to impair water quality and pose potential human health problems. State and federal minimum treatment requirements are not being met in every instance. The 1986 Needs Survey identified a capital investment need of $1.14 billion to construct and rehabilitate wastewater treatment facilities and components for Kentucky, based on the 1986 population. Backlog needs of $1.14 billion, coupled with long-range needs for publicly-owned treatment facilities, reveal a projected total need of over $1.52 billion through the year 2008. A detailed breakdown of investment needs is presented in Table 33.

Table 33

Investment Needs for Wastewater Treatment Facilities in Kentucky 1986-2008 (In January 1986 millions of dollars)

Facility	For Current 1986 Population	Projected Needs 2008 Population
Secondary treatment	$ 193	$ 286
Advanced secondary treatment	$ 53	$ 78
Infiltration/Inflow	$ 76	$ 76
Major rehabilitation of sewers	$ 8	$ 8
New collector sewers	$ 536	$ 646
New interceptor sewers	$ 252	$ 401
Correction of combined sewer overflows	$ 22	$ 22
Total	$1,140	$1,517

The 1986 305(b) Report to Congress described Kentucky's Water Infrastructure Report and concluded that a revolving loan fund concept was the most feasible option for Kentucky in meeting its water infrastructure needs. Because the federal law was not in place at that time, Kentucky was unable to pass appropriate legislation during the 1986 Kentucky General Assembly.

When the 100th Congress of the United States passed HR 1, this initiated the final steps toward establishment of state revolving funds. States were given the option of using a portion of the allotment for grants through FY 90. Kentucky made the decision to place all federal dollars in the revolving fund to the extent possible beginning in FY 88. A few large segmented grant projects require continuation of grant funding through FY 89. An early transition from grants to loans will assure more available dollars in the revolving loan fund over the long term.

Kentucky state legislation was drafted and has been revised through the committee process. At this time, the legislation is awaiting approval by the Senate and will become law upon signature by the Governor. Kentucky expects to receive a capitalization grant from EPA during the latter part of FY 88. Provisions have been made in the state biennial budget for the 20 percent match, and if passed by the 1988 General Assembly, the first projects will be funded during FY 89. It is estimated that approximately $70 million will be available in federal and state funding for the 1989-1990 state biennium. This should be a first step toward funding the $441 million of requests contained in the state's priority list, plus other wastewater needs which have not yet been placed on the priority list.

Because these needs far exceed available funding through grants and loans, the Division of Water has been pursuing other approaches. Three such areas are: 1) streamlining or reducing requirements, 2) community outreach and technical assistance, 3) enhanced construction management. These are described below:

- <u>Streamlined Requirements</u>

  A major benefit of the state revolving fund approach to financing such facilities is the opportunity to reduce or eliminate the burden of requirements of the past grant program. By simplifying this paperwork load, more money can be directly used to achieve water quality standards. Areas which are targeted include applications, planning, environmental reviews and documents, procurement, contract amendments, and change orders. The majority of projects increasingly involve smaller communities, which means an overall increase in the number of annually fundable projects. Efforts to streamline requirements would save time and money at both the state and local levels.

- <u>Community Outreach and Technical Assistance</u>

  Since projects will tend to be smaller over time, and since small communities have less management expertise than their bigger, more urban counterparts, they will need increasingly active assistance. The state will need to be aggressive in this area to assure success of the loan program and its effectiveness in meeting clean water goals. A strong partnership will be formed which will make available the state's expertise in planning, design, construction and financial management. In providing planning assistance, the state will focus on capital as well as operation and maintenance cost validation throughout the planning process. Enhanced design assistance will result from an increased, streamlined Value Improvement Program and value engineering efforts. Cost containment and value enhancement are priority objectives.

- <u>Construction Management</u>

  Greatly streamlined biddability and constructability and change order activites should directly benefit the construction phase of projects. Change order management is to be emphasized under the loan program. A number of the administrative burdens are slated for curtailment, which should expedite projects and reduce costs.

SURFACE WATER MONITORING PROGRAM

An effective water monitoring program is essential for making sound pollution control decisions and for tracking water quality improvements. Specifically, Kentucky's ambient monitoring program provides monitoring data to identify priority waterbodies upon which to concentrate agency activities, to revise state water quality standards, to aid in the development of wasteload allocations, and to determine water quality trends in Kentucky surface waters. As outlined in Kentucky's current Water Quality Management Continuing Planning Process, the major objectives associated with the Ambient Monitoring Program are:

1. To operate a fixed-station monitoring network meeting chemical, physical, and biological data requirements of the state program and EPA's Basic Water Monitoring Program (BWMP);

2. To conduct intensive surveys on priority waterbodies in support of stream use designations, wasteload allocation model calibration/verification, and other agency needs;

3. To store data in EPA's STORET system, a computerized water quality data base; and

4. To coordinate ambient monitoring activities with other agencies (EPA, Ohio River Valley Water Sanitation Commission, U.S. Geological Survey, U.S. Army Corps of Engineers, etc.).

Following is a discussion on components of the monitoring program (fixed-station monitoring, biological monitoring, intensive surveys). A citizen education program called WATER WATCH, which includes a monitoring element, is also discussed.

Fixed-Station Monitoring Network

Fixed-station stream water quality monitoring sites active during 1986-1987 are listed in Table 34. Locations of these sites are depicted in Figure 9. Excluding the mainstem of the Ohio River, data generated by this monitoring network were used to characterize approximately 1,500 stream miles within the state.

For the reporting period (1986-1987), the Division of Water's physicochemical network consisted of 45 stream stations located in ten river basins. Water samples collected monthly at each station were analyzed for the parameters shown in Table 35. In addition, the Division supports and uses data collected by the Ohio River Valley Water Sanitation Commission (ORSANCO) at five major tributary stations. The Division also uses data from eight major tributary stations maintained as part of the U.S. Geological Survey's National Stream Quality Accounting Network (NASQAN).

Table 34

Fixed- Station Stream Monitoring Network

Map No.	Station Name	RMI	Location
1	Tug Fork-Kermit	35.1	KY 40
2	Levisa Fork-Paintsville	69.4	US 23
3	Levisa Fork-Pikeville	117.3	KY 1426
4	Little Sandy River-Argillite	13.2	KY 1
5	Tygarts Creek-Load	28.1	KY 7
6	Licking River-Sherburne	126.7	KY 11
7	North Fork Licking River-Lewisburg	50.4	KY 419
8	South Fork Licking River-Cynthiana	49.1	KY 36/356
9	Licking River - Salyersville	266.9	KY 30
10	Eagle Creek-Glencoe	21.5	US 127
11	Kentucky River-Frankfort	66.4	St. Clair St. Bridge
12	South Elkhorn Creek-Midway	25.3	US 62/421
13	Dix River-Danville	34.6	KY 52
14	Kentucky River-Camp Nelson	135.1	Old US 27
15	Red River-Clay City	21.6	KY 15
16	Red River-Hazel Green	68.5	KY 746
17	Kentucky River-Heidelberg	249.0	KY 399
18	North Fork Kentucky River-Jackson	304.5	Old KY 30
19	Middle Fork Kentucky River-Tallega	8.3	KY 708
20	South Fork Kentucky River-Booneville	12.1	KY 28
21	Salt River-Shepherdsville	22.9	KY 61
22	Pond Creek-Louisville	15.4	Manslick Rd. Bridge
23	Rolling Fork-New Haven	38.8	US 31E
24	Beech Fork-Maud	48.1	KY 55
25	Green River-Munfordsville	225.9	Upstream US 31W
26	Nolin River-White Mills	80.9	White Mill Bridge
27	Bacon Creek-Priceville	7.3	C. Avery Rd. Bridge
28	Barren River-Bowling Green	37.5	College St. Bridge
29	Green River-Cromwell	130.6	Ohio Co. Water Dist. Intake
30	Mud River-Lewisburg	44.5	KY 106
31	Pond River-Apex	62.8	KY 189
32	Pond River-Sacramento	12.4	KY 85
33	Rough River-Dundee	62.5	Davidson Rd. Bridge
34	Tradewater River-Olney	72.6	KY 1220
35	Cumberland River-Pineville	654.4	Pine St. Bridge
36	Cumberland River-Cumberland Falls	562.3	KY 90
37	Rockcastle River Billows	24.4	Old KY 80
38	Horse Lick Creek-Lamero	7.5	Daugherty Road
39	Buck Creek-Eubank	45.0	KY 70
40	Big South Fork Cumberland River-Yamacraw	40.3	KY 92
41	Cumberland River-Burkesville	427.0	Allen St. Boat Dock
42	Little River-Cadiz	24.4	KY 272
43	Clarks River-Almo	53.5	Almo-Shiloh Rd. Bridge
44	Mayfield Creek-Magee Springs	10.8	KY 121
45	Bayou de Chien-Clinton	15.1	US 51

Fixed - Station Monitoring Network
Stream Station Locations

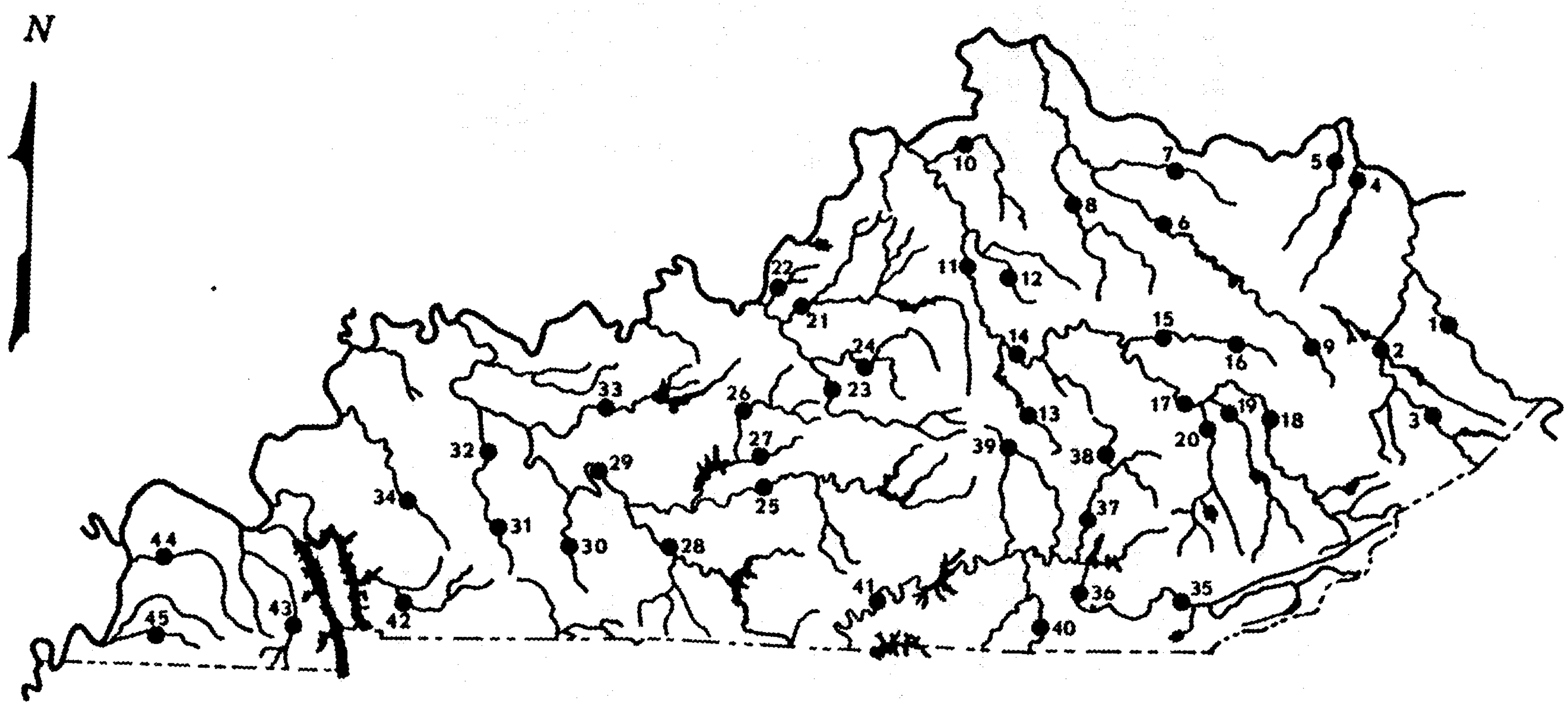

Figure 9

Table 35

Stream Fixed-Station Parameter Coverage
( ) STORET Parameter Code

Parameters	Parameters
<u>Field Data</u>	<u>Laboratory Data</u>
Weather code (47501)	Acidity, mg/l (00435)
Air temp, °C (00020)	Alkalinity, mg/l (00410)
Water temp, °C (00010)	BOD, 5-day, mg/l (00310)
Specific conductance uS/cm @ 25C (00094)	Chloride, mg/l (00940)
D.O., mg/l (00299)	Sulfate, dissolved mg/l (00946)
pH, S.U. (00400)	Suspended solids mg/l (00530)
Turbidity, N.T.U. (82078)	TOC, mg/l (00680)
Flow, cfs (00060)	
<u>Minerals, Total*</u>	
Calcium, mg/l (00916)	
Magnesium, mg/l (00927)	<u>Metals, Total*</u>
Potassium, mg/l (00937)	
Sodium, mg/l (00929)	Aluminum, ug/l (01105)
Hardness, mg/l (00900)	Arsenic, ug/l (01002)
	Barium, ug/l (01007)
<u>Bacteria</u>	Cadmium, ug/l (01027)
	Chromium, ug/l (01034)
Fecal coliform, colonies per 100 ml (31616)	Copper, ug/l (01042)
	Iron, ug/l (01045)
<u>Nutrients</u>	Lead, ug/l (01051)
	Manganese, ug/l (01055)
NH_3-N, mg/l (00610)	Mercury, ug/l (071900)
NO_2 + NO_3-N, mg/l (00630)	Zinc, ug/l (01092)
TKN, mg/l (00625)	
Total phosphorus, mg/l (00665)	

*Total as Total Recoverable

Lake monitoring was continued in 1986-1987 to address needs of two objectives. First, several lakes were sampled to evaluate problems of accelerated eutrophication. Second, three lakes were sampled to evaluate trends relating to potential acid precipitation impacts. Lakes in the ambient monitoring program are listed in Table 36, and the parameters measured are in Table 37.

Table 36

Lake Ambient Monitoring Network

Lake	Station Location
	Eutrophication Trend Lakes
Reformatory	Dam
Barren River	Dam
	Beaver Creek Arm
	Skaggs Creek Arm
Green River (1986 only)	Dam
	Corbin Bend Area
	KY 551 Bridge
Rough River (1986 only)	Dam
	KY 259 Bridge
	Walkers Creek Area
Cumberland	Big Lily Creek Embayment
	Beaver Creek Embayment
Buckhorn (1986 only)	Dam
	Midlake Area
	Upperlake Area
Nolin River (1987 only)	Dam
	Long Falls Creek Area
	Sportsman Paradise Area
	KY 88 Bridge Area
	Bacon Creek Area
Dale Hollow (1987 only)	Sulphur Creek Area
	Williams Creek Area
	Fanny's Branch Area
	Illwill Creek Area
	Little Sulphur Creek Area
	Spring Creek Area
	Acid Precipitation Trend Lakes
Tyner	Dam
Cannon Creek	Dam
Bert Combs	Dam

Table 37

Lake Ambient Monitoring Parameters

Parameters	EUT[1]	ACP
Dissolved oxygen	X	
Temperature	X	
pH	X	X
Specific conductance	X	X
Depth of euphotic zone	X	
Acidity		X
Acid neutralizing capacity (Alkalinity)	X	X
T.[2] aluminum		X
Extractable aluminum		X
D.[3] Calcium		X
D. chloride		X
T. fluoride		X
D. fluoride		X
D. inorganic carbon		X
D. organic carbon		X
D. iron		X
D. magnesium		X
D. potassium		X
D. silica		X
D. sodium		X
D. sulfate		X
T. phosphorus	X	
T. soluble phosphorus	X	
Orthophosphate	X	
Ammonia-N	X	X
Nitrite & nitrate-N	X	
T. Kjeldahl-N	X	
Chlorophyll *a*	X	
Color		X

[1] EUT - lake eutrophication evaluation
ACP - lake acid precipitation evaluation

[2] Total

[3] Dissolved